REMARKS/ARGUMENTS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-12 and 21-23 are presently active. Claims 13-20 were withdrawn from consideration. Claims 2and 9 have been cancelled without prejudice. Claims 1, 4-5, 7-8, 11, and 21 have been presently amended.

In the outstanding Office Action, Claims 1-12 and 21-23 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Pomarede et al (US 2004/0147101 A1) and further in view of Koyama et al (US 2002/0149065A1).

M.P.E.P. § 2143 requires for a *prima facie* case of obviousness that the prior art reference (or references when combined) must teach or suggest all the claim limitations. M.P.E.P. § 2143 also requires for a *prima facie* case of obviousness that there must be some suggestion or motivation, either in the references or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference.

Independent Claims 1, 8, and 21 presently define that the claimed insulating film includes a metal-N bond in an amount of 1 atomic% or more. As discussed in the background section of the present application, an HfSiON film having a high dielectric constant capable of suppressing crystallinity and leakage current was not realized by others working in this field. See page 2, lines 21 - 23 of Applicants' specification. As indicated in Applicants' specification, page 3, lines 4 - 10, the present invention is directed to providing a semiconductor device having an insulating film formed of a nitrogen-incorporated metal silicate film with a high dielectric constant, capable of reducing leakage current lower than an oxide film, and suppressing crystallinity.

Applicants have discovered that a concentration of Hf-N bonds of 1% or more suppresses the crystallization of an HfSiON film. See Applicants' specification, page 12, line

26 to page 13, line 1. Accordingly, in the present invention, it is possible to provide a semiconductor device having an insulating film formed of a nitrogen-containing metal silicate film which is capable of suppressing the crystallization of a film, having a sufficiently high dielectric constant, and reduced in leakage current lower than an oxide film. See page 24, lines 4 - 12. The above-described semiconductor device is obtained upon the insulating film including a metal -N bond in an amount of 1 atomic% or more.

Regarding Pomarede et al and Koyama et al, Applicants respectfully submit that Claims 1 - 12 and 21 - 23 of the present invention are not rendered obvious by Pomarede et al or Koyama et al or a combination thereof.

Pomarede et al only disclose an insulating film containing a metal, Si, N, and O. Pomarede et al do not disclose an insulating film including a metal-N bond in an amount of 1 atomic% or more. Further, the deficiencies of Pomarede et al are not overcome by Koyama et al. Indeed, the Office Action states on page 5, lines 7-10, that both Pomarede et al and Koyama et al are "silent about the atomic percentage of the metal-N bonds." The Office Action therein asserts that it would have been obvious to form a device such that a content of the metal-N bonds in the insulating film is 1 atomic % or more. Applicants respectfully traverse this assertion for the reasons given below.

Applicants submit that, in order to achieve one of the objects in Koyama et al, an atomic % of the metal-N bond in an insulator must be reduced. For instance, in paragraph [0012], Koyama et al indicate that its object is to provide a MIS field effect transistor comprising a gate insulating film containing a high-K material and having a relative dielectric constant substantially equal to that of a metal oxide. This object is achieved in Koyama et al by defining the density of the metal-nitrogen bonds in the metal oxynitride film to be no more than $10^{19}/cm^3$. See paragraph [0052]. This density of $10^{19}/cm^3$ corresponds to about 0.1 atomic %

of metal-N bonds, far less than the metal-N bond concentration defined by the present invention (i.e., 1 atomic% or more).

Thereafter in paragraph [0053], Koyama et al disclose that:

> If a metal nitrogen bond is formed in the metal oxynitride film, problems such as generation of the defect in the film and decrease of the relative dielectric constant are generated. However, one embodiment of the present invention permits completely avoiding these problems. Therefore, it is very important to define that the metal atom does not directly forms a chemical bond with the nitrogen atom in the metal oxynitride film. It has already been confirmed experimentally that the particular type of the chemical bond permits sufficiently producing the effect of elevating the crystallization temperature of the film.

Accordingly, there is no motivation for increasing the concentration of the metal-N bonds in the insulating film of Koyama et al to 1 atomic % or more. Rather, Koyama et al in disclosing that it is very important to define that the metal atom does not directly forms a chemical bond with the nitrogen atom in the metal oxynitride film ***teach away*** from an insulating film including a metal-N bond in an amount of 1 atomic% or more, as higher concentrations of metal-N bonds increase the probability that a metal atom will form a chemical bond with the nitrogen atom in a metal oxynitride film.

Contrary to Koyama et al, the insulating film of the semiconductor device of the present invention includes a metal-N bond in an amount of 1 atomic% or more. Thus, even a combination of Pomarede et al and Koyama et al will not yield the semiconductor device of the present invention.

With no disclosure or suggestion of the above-noted features and with Koyama et al teaching away from the present invention, it is respectfully submitted that independent Claims 1, 8 and 21 and the claims dependent therefrom patentably define over the cited references in the Office Action.

Consequently, in view of the present amendment and in light of the above discussions, the outstanding grounds for rejection are believed to have been overcome. The application as amended herewith is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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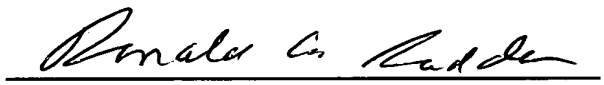

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